MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015 / 2016

TCP2651 – CONCEPTS OF PROGRAMMING LANGUAGES / TCP2411 – PROGRAMMING LANGUAGE CONCEPTS

(All sections / Groups)

16 OCTOBER 2015
9:00 a.m. – 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **5 pages** only including the cover page with 4 Questions.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers **CLEARLY** in the Answer Booklet provided.

Question 1 (5+4+4+2 marks)

(a) Briefly explain from the programmer perspective each of the following reasons for studying concepts of programming languages.

i. Increased capacity to express ideas
ii. Improved background for choosing appropriate languages
iii. Increased ability to learn new languages
iv. Better understanding of the implementation of concepts
v. Overall advancement of computing

(b) Consider the following program which finds the area of the triangle using the formula "0.5 × base × height".

```
#include<iostream>
using namespace std;
int main()
{
double a=3.0, b=4.0, ab, c;
ab = a * b;
c = 1/2.0 * ab;
cout << "Area of triangle is " << c << endl;
return 0;
}
```

The above program is not readable. What are the FOUR essential qualities of a readable program?

(c) Explain FOUR criteria used in evaluating the cost of a programming language.

(d) How does the support for exception handling contribute to the reliability of a language?

Continued.....

Question 2 (3+2+4+6 marks)

(a) Can a syntactically correct statement be semantically wrong? Provide an example to support your answer.

(b) What is EBNF often used for in computer science?

(c) Draw the syntax graph for the following EBNF.
<if_stmt> → if (<logic_expr>) <stmt> {else if <stmt>} [else <stmt>]

(d) Given the following context-free grammar of a language.

S → aSa | bSb | ϵ

i. The above grammar G of a language is defined by the four-tuple, G = (T, N, S, P). List down what T, N, S, and P are.
ii. Show that aabbaa is a valid sentence of this grammar using derivation.
iii. Show that bbaabb is a valid sentence of this grammar using parse tree.
iv. Describe the language generated by this grammar.

Continued.....

Question 3 (2+4+4+5 marks)

(a) What are the TWO disadvantages of dynamic type binding?

(b) Explain with an example in C++ what an explicit heap-dynamic variable is.

(c) What are the TWO most important design issues that are specific to character string data types? In your answer, compare two different programming languages for each design issue.

(d) Give an example in C for each of the following expressions.
   i. Arithmetic expression
   ii. Conditional expression
   iii. Relational expression
   iv. Boolean expression
   v. Assignment expression

Continued.....

Question 4 (3+3+2+1+6 marks)

(a) What are the THREE design issues for two-way selectors? In your answer, compare two different programming languages for each design issue.

(b) Translate the pseudocode below of a for-loop to C++ using a while-loop.

```
for(int i = 0; i < 10; i++)
      print i
```

(c) What is a subprogram?

(d) What is the concept behind subprograms?

(e) Consider the program below. The line numbers at the left are shown only for reference.

```
 1  #include <iostream>
 2  using namespace std;
 3  void odd(int x);
 4  int main()
 5  {
 6    int i;
 7    do {
 8      cout << "Enter number (0 to exit): ";
 9      cin >> i;
10      odd(i);
11    } while(i!=0);
12    return 0;
13  }
14  void odd(int x)
15  {
16    if ((x%2)!=0) cout << "It is odd.\n";
17    else          cout << "It is even.\n";
18  }
```

Identify the correct code segment from the above program for each of the following:

i. Subprogram definition
ii. Subprogram header
iii. Subprogram call
iv. Prototype
v. Formal parameter
vi. Argument

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